

**DC-TO-DC POWER REGULATOR HAVING NON-LINEAR LOAD LINE  
AND AUTOMATIC LEAKAGE CURRENT OFFSET ADJUSTMENT**

**ABSTRACT**

A voltage regulator exhibits a load line that is piecewise linear. This piecewise linearity variation has a first constant voltage segment  $V_{LEAK}$  at which output voltage is regulated for output currents less than or equal to the leakage current  $I_L$ . The output voltage  $V_{LEAK}$  corresponds to the maximum output voltage allowable at the leakage current for a given operational range specification. The piecewise linearity variation further includes a second, linearly decreasing segment that varies from the maximum allowable output voltage  $V_{LEAK}$  at the leakage current to a full load voltage  $V_{DROOP}$  at full load current  $I_{FL}$ . This serves to effectively maximize the available output voltage swing in the presence of a leakage current offset. The piecewise linear load line is adjustable to accommodate changes in leakage current.